

R E M A R K S

Reconsideration of this application, as amended, is respectfully requested.

ALLOWABLE SUBJECT MATTER

The Examiner's indication of the allowability of the subject matter of claims 4 and 9 is respectfully acknowledged. These claims, however, have not been rewritten in independent form at this time since, as set forth in detail hereinbelow, it is respectfully submitted that their respective parent claims also recite allowable subject matter.

THE DRAWINGS

With respect to the Examiner's objection regarding reference characters SL and SU, it is respectfully pointed out that these reference characters are mentioned in the specification at page 27, line 20 to page 28, line 7.

With respect to the Examiner's objection regarding reference character md', the specification has been amended at page 8, line 2 to refer to this reference character.

With respect to the Examiner's objection regarding Fig. 3, the typographical error pointed out by the Examiner has been corrected.

With respect to the Examiner's objection regarding reference characters RW and SC, it is respectfully pointed out that these reference characters are shown, for example, in Figs. 11 and 13.

With respect to the Examiner's objection regarding reference character WD, Fig. 6 has been amended to refer to this reference character in accordance with the disclosure in the specification at page 27, lines 13-18.

In addition, Figs. 6, 11 and 20 have also been amended to correct some additional minor typographical errors of which the undersigned has become aware.

Submitted herewith are corrected sheets of formal drawings which incorporate the amendments to Figs. 3, 6, 11 and 20, and annotated sheets showing the changes made thereto.

No new matter has been added, and it is respectfully requested that the amendments to the drawings be approved and entered and that the Examiner's objections to the drawings be withdrawn.

THE SPECIFICATION

The abstract has been amended to better comply with the requirements of MPEP 608.01(b) as required by the Examiner. In addition, the specification has been amended at page 8 to refer to reference character md', and the specification has also been amended to correct some minor informalities of which the

undersigned has become aware. No new matter has been added, and it is respectfully requested that the amendments to the specification be approved and entered, and that the objection to the specification be withdrawn.

THE CLAIMS

Claims 1-13 and 15 have been amended only to make some minor grammatical improvements and/or to correct some minor antecedent basis problems so as to put the claims in better form for issuance in a U.S. patent.

No new matter has been added, and it is respectfully requested that the amendments to the claims be approved and entered. It is respectfully submitted, moreover, that the amendments to the claims are not related to patentability, and do not narrow the scope of the claims either literally or under the doctrine of equivalents.

THE PRIOR ART REJECTION

Claims 1-3, 5-8 and 10-16 were rejected under 35 USC 103 as being obvious in view of various combinations of USP 6,744,530 ("Someno et al"), JP 2002-112010 ("Minagawa"), USP 6,256,105 ("Nobuaki et al"), USP 7,094,977 ("Ericson et al"), USP 5,481,375 ("Eto et al"), and JP 08-293996 A ("Orita et al"). These rejections, however, are respectfully traversed.

According to the claimed present invention an image recording apparatus and image forming method are provided whereby a complete image that is larger in width than a recording-medium is divided into a plurality of images and the divided images are recorded on a plurality of recording-media. In particular, the image recording apparatus and method of the claimed present invention are directed to printing the divided images on a plurality of smaller sized recording media in a manner so as to make the density difference between the sides of a combining line small and inconspicuous.

More specifically, according to the present invention as recited in claim 1, for example, the image-recording apparatus comprises an image recording assembly which includes a recording-head to record an image on a recording-medium and a recording-medium-carrying mechanism to carry the recording-medium relatively to the recording-head, and a control section which includes an image-processing section to subject image data of the complete image to image processing and which controls the image recording assembly. As recited in claim 1, the image-processing section divides the image data of the complete image into a plurality of image data pieces indicative of divided images, detects two adjoining divided-images that each individually have a joint portion and adjoin each other at the respective joint portions, in the divided images indicated by the divided image

data pieces, and rotates one of the adjoining divided-images so as to make a recording direction of one of the adjoining divided-images opposite to a recording direction of the other adjoining divided-image. And as recited in claim 1, the control section controls the image recording assembly so that the recording medium is carried in one direction during recording of all divided-images, the divided images are recorded on the respective recording-media one by one to form a plurality of output images, and the plurality of output images configure one complete image.

Thus, with the structure of the claimed present invention, the printing direction for one of the two divided images to be adjoined and combined with each other and the printing direction for the other of the two divided images are reversed. Namely, as recited in claim 1, for example, one of the adjoining divided images is rotated so as to make a recording direction of one of the adjoining divided images opposite to a recording direction of the other adjoining divided image. That is, while the image recording apparatus prints out one divided image on one image recording medium in a direction directed from an upper position to a lower position, the image-recording apparatus also prints out the inverted other divided image on another image recording medium in a direction directed from an upper position to a lower position.

Therefore, in a case where two image recording mediums on which two divided images are recorded are adjoined and combined with each other to make a large image corresponding to a complete large sized original image, while a starting point of printing of one divided image on one image recording medium and a starting point of printing of the other divided image on the other image recording medium are positioned at opposite ends which are farthest from the combining line on the adjoined and combined two image recording mediums, an end point of printing of one divided image on one image recording medium and an end point of printing of the other divided image on the other image recording medium are positioned side by side at both sides of the combining line on the adjoined and combined two image recording mediums.

As a result, a density characteristic of the image-recording apparatus at both sides of the combining line on the combined two divided images becomes the same, so that when plural images are combined to make a complete large image, the combining line in the complete large image is not conspicuous. (See, for example, Figs. 9 and 10 of the present application.)

As recognized by the Examiner, Someno et al discloses an image recording apparatus which divides a complete image that is larger in width than a recording medium into a plurality of images, and which records the divided images on a plurality of recording media.

It is respectfully submitted, however, that Minagawa does not disclose, teach or suggest rotating one of adjoining divided images so as to make a recording direction of the one of the adjoining divided images opposite to a recording direction of the other of the adjoining divided images.

Minagawa discloses a method for scanning an original image and printing dividedly the original image in a digital copying device. With this method, a plurality of original images (including characters) printed at a plurality of positions of an original sheet of a predetermined large size (for example, size A3) are scanned by a scanner, and then the scanned images are printed on output sheets in a split manner (for example, in half), with each of the output sheets being a smaller size than the large predetermined size (for example, a sheet of a half of the large size: that is size A4). See paragraph [0002] of Minagawa.

Fig. 9 of Minagawa illustrates steps of this method in which a whole of original images (an entire image of numerals 1 and 2) on a predetermined large sized original sheet (size A3) on a left-hand side is scanned by a scanner and the scanned images are dividedly printed on two output sheets of a predetermined smaller size (size A4) shown on a right-hand side. In this case, the numerals 1 and 2 are dividedly printed out on the two output sheets of the predetermined smaller size in this order.

Fig. 10 of Minagawa illustrates steps of this method in a different case in which the original sheet of the predetermined large size shown on a left-hand side is fed to the scanner while it is turned upside down, and the whole of the inverted original images on the inverted original sheet is scanned by the scanner, and the scanned inverted images are printed out on the two output sheets of the predetermined smaller size in a reverse order relative to the printing order of the non-inverted scanned images in the case shown in Fig. 9. That is, in the case of Fig. 10, the inverted numerals 2 and 1 as the scanned inverted images are printed on the two output sheets in this order. See paragraph [0004] of Minagawa.

In the case shown in Fig. 10 of Minagawa, the user who picked up the two output sheets on which the two divided images were printed out in the upside-down direction and in reverse order must rearrange these two output sheets in the correct direction and correct order. In order to avoid this troublesome handling of the two output sheets, Minagawa provides the following steps. That is, the up-and-down direction of a plurality of images on the original sheet is checked while it is scanned by the scanner, and if the direction of the scanned images are inverted (see Fig. 3 (2)), each of the scanned images (in Fig. 3 (2), the numeral 2 on the left-hand side, which is turned upside down and the numeral 1 on the right-hand side,

which is also turned upside down) is rotated by 180 degrees independently from each other. After that, the scanned images, whose upside-down direction has been corrected (the numeral 2 on the left-hand side, whose upside-down direction has been corrected, and the numeral 1 on the right-hand side, whose upside-down direction has been corrected), are dividedly printed out on the two output sheets in the reverse order (that is, at first the non-inverted numeral 1 is printed out on one output sheet and then the non-inverted numeral 2 is printed out on another output sheet).

As described above, in Minagawa, an original image on an original sheet of a predetermined large size is divided into two divided images, and then the two divided images are printed out on two output sheets each of which is the predetermined smaller size. However, in Minagawa, each of the two divided images is printed out on each of the two output sheets in the same printing direction.

In addition, it is respectfully submitted that Minagawa does not even address the issue solved by the claimed present invention whereby adjoining divided images are printed such that the density difference or contrast between the sides of the adjoining divided images along a combining line the combined line is made to be small.

In view of the foregoing, it is respectfully submitted that the present invention as recited in each of independent claims 1, 13 and 15, as well as each of claims 2-12 depending from claim 1, clearly patentably distinguishes over Someno et al and Minagawa, and all of the other prior art references of record, taken singly or in any combination consistent with the respective fair teachings thereof, under 35 USC 103.

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Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,

/Douglas Holtz/

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